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NOTICES OF NEW BOOKS.

La théorie de la physique chez les physiciens contemporains. Par ABEL REY. Paris, F. Alcan, 1907. — pp. v, 412.

According to M. Rey, the opinion is wide-spread among philosophers, that physical science has been conclusively shown to be wholly arbitrary and conventional and without claim to real objectivity ; and that this has been admitted and even proclaimed by the foremost physicists of the present day. The work before us is the result of an inquiry into the actual opinions of physicists in this matter. It is described by the author as a contribution to the history of the scientific spirit ; that is to say, "of the atmosphere in which science has been created and developed."

Contemporary physicists are divided into three schools, according to their relation to the mechanical theory of the universe which held sway up to the middle of the nineteenth century. As the defects of the traditional 'mechanism' became manifest, it has been rejected outright by some (Rankine, Mach, Ostwald, Duhem), viewed with non-commital suspicion by others (Poincaré), and amended and developed in its own spirit by still others (Helmholtz, Maxwell, Lord Kelvin). The fundamental and characteristic opinions of the three schools are expounded by M. Rey with the utmost impartiality and without effort at criticism. His personal inclination toward a mechanical theory is, however, sufficiently indicated in the remark that the vast majority of experimental physicists belong to the "continuators of mechanism" ; and that the opponents of mechanism have been, for the most part, rather mathematicians than physicists, — men whose habitual employment with mere concepts has lessened their appreciation for the concrete material of physical science.

The net result of M. Rey's inquiry is that physicists of all three schools agree in claiming for their science the highest degree of objectivity possible to human knowledge. Though men like Mach and Duhem may emphasize the independent activity of reason, as it brings the data of experience into harmony with its peculiar standards of 'economy' or 'coherence' ; nevertheless all alike agree that in the brute facts of observation themselves the activity of reason finds an absolute limit to its caprice. Furthermore, the objectivity which is claimed for physics is on all hands described as purely empirical ; there is no metaphysical pretence of ability to reconstruct the universe as it really is. The older mechanism was, indeed, very largely metaphysical ; but the new is at least as phenomenalistic as the rival schools. The legitimate scope of hypothesis is by all schools admitted to be enormous, and, moreover, increasingly great as one ascends from the data of experience to higher and higher generalizations.

The elements employed in explanation have no finality ; they are elementary only with respect to existing modes of analysis. If an atomism, for example, be embraced, the atoms are not conceived as absolutely irreducible and unchangeable ; they are but unaffected by any of the processes of which science has yet taken cognizance. If truth is claimed for any proposition of science, that does not mean that it is thought to be incapable of modification. In the future development of science, the axioms of to-day will no doubt become mere special cases of more comprehensive laws, within which the limits of their application will have become manifest. It is, however, insisted that the progress of science is, indeed, a development ; that the truth of to-day is not set aside by the truth of to-morrow, but carried up and incorporated in it. It is this insistence upon the historical continuity of physics, that takes away from the theories of Mach and Duhem, in particular, practically all the arbitrariness which has ignorantly been ascribed to them.

It will be seen even from this imperfect summary, that M. Rey's volume contains a good deal of healthy common-sense ; though one may suspect that the scepticism which the author so earnestly combats is not so widespread as he imagines. Men, for example, who proclaim that the propositions of physical science have no validity beyond their practical serviceableness in directing conduct and ministering to the satisfaction of human needs, are less often denying the objective truth of physics, than asserting a positive theory as to the nature of objectivity and of truth. The author's own epistemology, of which a sketch is given at the end of the volume, appears to be of a rather shallow species of evolutionism ; but as he informs us that the present volume is only an introduction to a far more comprehensive philosophical work, we should, perhaps, refrain from a premature judgment. Judging, however, from what we have before us, we should surmise that one half of the difficulties of epistemology are to be solved by the principle, that the sensation is intrinsically a relation, and knowledge a system of relations of relations ; while the other half are to be disposed of by the discovery, that the categories of reason are instincts which have been acquired by the adaptation of the psychophysical organism to its environment.

Whatever may be its underlying defects, the work is certainly the outcome of laborious and careful scholarship, and cannot fail to be useful. To those who may contemplate referring to it for the sake of its presentation of contemporary physical theories, the warning may be given that the author's purpose has led him to emphasize very strongly the common features of these theories.

THEODORE DE LAGUNA.

BRYN MAWR COLLEGE.